

WHAT IS CLAIMED IS:

1. A pusher assembly of a stent delivery system for use in a target duct or vessel having an acute bend at a known general location in the body of a patient, the pusher assembly comprising:

a first tubular portion;

a second tubular portion having a part extending distally from the first tubular portion, the second tubular portion including a flexible section and a stent-carrying section located distally to the flexible section; and

a soft pusher member configured to urge a self-expanding preloaded stent from an introducer catheter within which the preloaded stent is slidably disposed, the soft pusher member being disposed along the second tubular portion at a location which is either proximal to or within the stent-carrying section, the soft pusher member being made of a polymer and cooperating with the preloaded stent to absorb preload pressure of the preloaded stent when the soft pusher member is positioned at the acute bend in the body during deployment of the preloaded stent.

2. The assembly of Claim 1 wherein the flexible section of the second tubular portion has a preselected length and a location along the pusher assembly such that when the pusher assembly and the preloaded stent are disposed within the introducer catheter and are subjected to lateral bending stresses at the known general location in the body, the flexible section of the second tubular portion traverses the known general location in the body, whereby the likelihood of a kink occurring in the introducer catheter is greatest within a region corresponding to the region of greatest flexibility of the pusher assembly.

3. The assembly of Claim 1 wherein the soft pusher member includes a radiopaque filler.

4. The assembly of Claim 1 wherein the polymer of the soft pusher member is a low density polymer.

5. The assembly of Claim 1 wherein the polymer of the soft pusher member is polytetrafluoroethylene.

6. The assembly of Claim 1 wherein the second tubular portion has a smaller outer diameter than that of the first tubular portion.

7. The assembly of Claim 6 wherein the second tubular portion comprises a metal-reinforced polymer material.

8. The assembly of Claim 7 wherein the metal-reinforced polymer material comprises braided polyimide tubing.

9. The assembly of Claim 1 wherein the second tubular portion comprises a nickel-titanium alloy.

10. The assembly of Claim 1 wherein the second tubular portion extends to a distal end, the second tubular portion includes a distal tip affixed about the distal

end, the stent-carrying section and the flexible section being comprised of a single continuous element, the preloaded stent being positioned along the stent-carrying section such that the preloaded stent is disposed between and in contact with the distal tip and the soft pusher member, the distal tip being tapered at its proximal end to receive the stent.

11. A stent delivery system for use in target duct or vessel having an acute bend at a known general location in the body of a patient, the system comprising:

a pusher assembly including a soft pusher member configured to urge a preloaded stent from an introducer catheter within which the preloaded stent is slidably disposed, the pusher assembly comprising a first tubular portion and a second tubular portion, at least a part of the second tubular portion extending distally from the first tubular portion, the second tubular portion including a flexible section and a stent-carrying section located distal to the flexible section, the soft pusher member being disposed along the second tubular portion at a location which is either proximal to or within the stent-carrying section, the soft pusher member being made of a low density polymer and configured to cooperate with the preloaded stent for absorbing preload pressure of the preloaded stent when the soft pusher member is positioned at the acute bend during deployment of the stent.

12. The stent delivery system of Claim 11 wherein the flexible section of the second tubular portion has a preselected length and a location along the pusher assembly such that when the pusher assembly and the preloaded stent are disposed within the introducer catheter and are subjected to lateral bending stresses

at the known general location in the body, the flexible section of the second tubular portion traverses the known general location in the body, whereby the likelihood of a kink occurring in the introducer catheter is greatest within a region corresponding to the region of greatest flexibility of the pusher assembly.

13. The stent delivery system of Claim 11 wherein the soft pusher member includes a radiopaque filler.

14. The stent delivery system of Claim 11 further including the stent preloaded within a distal portion of the introducer catheter, the stent having a proximal end and a distal end opposite the proximal end, the proximal end being received by the soft pusher member to absorb preload pressure of the stent.

15. The stent delivery system of Claim 14 wherein the soft pusher member includes a face having a diameter equal to or greater than that of the preloaded stent while the stent is loaded in the introducer catheter, the proximal end of the preloaded stent being adjacent to the face of the pusher member.

16. The stent delivery system of Claim 14 wherein the stent is a self-expanding stent.

17. The stent delivery system of Claim 14 further including the introducer catheter in which the pusher assembly and the stent are slidably disposed.

18. The stent delivery system of Claim 11 wherein the second tubular portion has a smaller outer diameter than that of the first tubular portion.

19. The stent delivery system of Claim 18 wherein the second tubular portion comprises a metal-reinforced polymer material.

20. The stent delivery system of Claim 19 wherein the metal-reinforced polymer material comprises braided polyimide tubing.

21. The stent delivery system of Claim 11 wherein the second tubular portion comprises a nickel-titanium alloy.

22. The stent delivery system of Claim 11 wherein the second tubular portion extends to a distal end, the second tubular portion includes a distal tip affixed about the distal end, the stent-carrying section and the flexible section being comprised of a single continuous element, the preloaded stent being positioned along the stent-carrying section such that the preloaded stent is disposed between and in contact with the distal tip and the soft pusher member, the distal tip being tapered at its proximal end to receive the stent.

23. A stent delivery system, comprising:
an introducer catheter having a distal portion, the distal portion having a distal end;

a stent preloaded within the distal portion of the introducer catheter, the stent having a proximal end and a distal end;

a pusher assembly including a soft pusher member configured to urge the preloaded stent from the introducer catheter within which the preloaded stent is slidably disposed, the pusher assembly comprising a first tubular portion and a second tubular portion, at least a part of the second tubular portion extending distally from the first tubular portion, the second tubular portion including a flexible section and a stent-carrying section located distal to the flexible section, the soft pusher member being disposed along the second tubular portion at a location which is either proximal to or within the stent-carrying section, the soft pusher member including a face having a diameter equal to or greater than that of the stent preloaded in the introducer catheter, the soft pusher member being made of a polymer and configured to cooperate with the preloaded stent such that the face of the soft pushing member absorbs preload pressure of the preloaded stent when the soft pusher member is positioned at the acute bend during deployment of the stent; and

a distal tip affixed about the distal end of the second tubular portion, the stent being loaded between the distal tip and the face of the pusher member such that during deflection of the stent introducer apparatus, the point along the introducer catheter that receives the largest amount of bending stress and represents the more likely point where a kink would occur, is located proximal the pusher member.

24. The stent delivery system of Claim 23 wherein the second tubular portion comprises a metal-reinforced polymer material.

25. The stent delivery system of Claim 24 wherein the metal-reinforced polymer material comprises braided polyimide tubing.

26. The stent delivery system of Claim 23 wherein the second tubular portion comprises a nickel-titanium alloy.

27. The stent delivery system of Claim 23 wherein the second tubular portion further includes a stent-carrying section extending distal the flexible section, the stent-carrying section extending distally to at least the distal end of the stent.

28. The stent delivery system of Claim 27 wherein the stent is a self-expanding stent.

29. A stent delivery system, comprising:
an introducer catheter having a distal end and a distal portion;
a stent preloaded within the distal portion of the introducer catheter, the stent having a proximal end and a distal end;
a pusher assembly including a soft pusher member configured to urge the preloaded stent from the introducer catheter within which the preloaded stent is slidably disposed, the pusher assembly comprising a first tubular portion and a second tubular portion, at least a part of the second tubular portion extending distally from the first tubular portion, the second tubular portion including a flexible section and a stent-carrying section located distal to the flexible section, the soft pusher

member being disposed along the second tubular portion at a location which is either proximal to or within the stent-carrying section, the soft pusher member being made of a low density polymer and configured to cooperate with the preloaded stent for absorbing preload pressure of the preloaded stent when the soft pusher member is positioned at the acute bend during deployment of the stent; and

a distal tip affixed about the distal end of the second tubular portion, the stent being tightly held between the distal tip and the face of the pusher member such that during deflection of the stent introducer apparatus, the point along the introducer catheter that receives the largest amount of bending stress is located proximal the pusher member,

the flexible section of the second tubular portion having a preselected length and a location along the pusher assembly such that when the pusher assembly and the preloaded stent are disposed within the introducer catheter and are subjected to lateral bending stresses at the known general location in the body, the flexible section of the second tubular portion traverses the known general location in the body, whereby the likelihood of a kink occurring in the introducer catheter is greatest within a region corresponding to the region of greatest flexibility of the pusher assembly.

30. A stent delivery system, comprising:
- an introducer catheter having a distal end and a distal portion;
 - a stent preloaded within the distal portion of the introducer catheter, the stent having a proximal end and a distal end;

a pusher assembly slidably disposed within the introducer catheter, the pusher assembly including both a second tubular portion having a first outer diameter and including a distal end; and a first tubular portion having a second outer diameter and located proximal of the second tubular portion, the second outer diameter being greater than the first outer diameter; and

a pusher member comprising a polymer material, the pusher member being located distal to the second tubular portion and in close proximity with the proximal end of the stent to absorb preload pressure of the stent, wherein the likelihood of a kink between the stent and the pusher member is reduced.

31. The stent delivery system of claim 30 wherein the polymer material comprises polytetrafluoroethylene.

32. The stent delivery system of claim 30 wherein the polymer material further includes a radiopaque filler material.

33. The stent delivery system of claim 30 wherein a distal end of the pusher member is in contact with the proximal end of the stent.

34. The stent delivery system of claim 30 wherein a distal end of the pusher member is in contact with the proximal end of the stent and conforms to the proximal end of the stent.

35. A stent delivery system for use in target ducts or vessels having an acute bend at a known general location in the body of a patient, the system comprising:

a pusher assembly including:

a first tubular portion;

a second tubular portion, at least a part of the second tubular portion extending distally from the first tubular portion, the second tubular portion including a flexible section and a stent-carrying section located distal to the flexible section; and

a soft pusher member configured to urge a preloaded stent from an introducer catheter within which the preloaded stent is slidably disposed, the soft pusher member being disposed along the second tubular portion at a location which is either proximal to or within the stent-carrying section, the soft pusher member being made of a low density polymer having a radiopaque filler and configured to cooperate with a preloaded stent for absorbing preload pressure of the preloaded stent when the soft pusher member is positioned at the acute bend,

the flexible section of the second tubular portion having a preselected length and a location along the pusher assembly such that when the pusher assembly and the preloaded stent are disposed within the introducer catheter and are subjected to lateral bending stresses at the known general location in the body, the flexible section of the second tubular portion traverses the known general location in the body, whereby the likelihood of a kink occurring in the introducer catheter is greatest within a region corresponding to the region of greatest flexibility of the pusher assembly.